

Revision of the Neotropical genus *Cheiromyia* Dyte (Diptera: Dolichopodidae)

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Abstract

The Neotropical dolichopodine genus *Cheiromyia* is revised. The limits of the genus are redefined to include only those species with one or more elongate projections on the male postpedicel. *Cheiromyia maculipennis* (Van Duzee) is transferred to *Paraclius* Loew **comb. nov.** *Cheiromyia* is now known from Costa Rica south to Bolivia and the Brazilian Atlantic Forest, and includes the following five species: *Cheiromyia bicornis* Brooks **sp. nov.**, *C. brevitarsis* Brooks **sp. nov.**, *C. laselva* Brooks **sp. nov.**, *C. palmaticornis* (Parent) and *C. pennaticornis* (Parent). A key to males is provided, as well as some remarks on related species of *Paraclius*.

Key words: Dolichopodidae, Dolichopodinae, *Cheiromyia*, *Paraclius*, Neotropical, new species, new combination, key

Introduction

The Neotropical genus *Cheiromyia* Dyte, 1980 (= *Cheirocerus* Parent, 1930) was established by Parent on the basis of the striking antenna of the type species, *C. palmaticornis* (Parent), with its slender pubescent projections on the outer surface of the male postpedicel. Parent (1931) described a second species, *C. pennaticornis* (Parent) from La Paz, Bolivia with similar projections on the male postpedicel. The generic name *Cheirocerus* Parent, 1930 was subsequently discovered to be preoccupied by *Cheirocerus* Eigenmann, 1917 (Pisces) and the replacement name *Cheiromyia* Dyte, 1980 was proposed.

Brooks (2005) expanded the generic limits of *Cheiromyia* to include a Neotropical species without the distinctive male antennae, i.e., *C. maculipennis* (Van Duzee, 1934). This expanded generic concept was based on the possession of a homologous enlarged sperm pump that is folded back on itself (character state 51:1, figure 8C in Brooks 2005). Several additional undescribed species related to *C. maculipennis* with a similarly enlarged folded sperm pump have now been discovered from the Neotropical Region (unpublished data). However, four recently described species of *Paraclius* Loew from the Brazilian Atlantic Forest (Capellari & Amorim 2009) have been found to possess intermediate degrees of folding in the sperm pump, currently making this character state problematic for discerning the generic limits of *Cheiromyia* sensu Brooks (2005) in relation to *Paraclius*. Given these new data, and also to ease future generic identifications of Neotropical *Paraclius* and *Cheiromyia*, the limits of *Cheiromyia* are herein restricted to include only those species with postpedicel projections on the male antenna. This definition is equivalent to Parent's original concept of *Cheiromyia*, and as a result *C. maculipennis* (Van Duzee) is transferred to *Paraclius* (see below).

Cheiromyia is now known from Central America south to La Paz, Bolivia in the west, and to the northern parts of the Brazilian Atlantic Forest (Pernambuco and Sergipe) in the east. The genus includes five species, three of which are newly described here. The purpose of this article is to redefine and revise *Cheiromyia* in

order to incorporate the new species, provide a new key, and give some remarks on related species of *Paraclius* Loew.

Materials and methods

Specimens examined in this study were obtained from the following collections: Department of Entomology, American Museum of Natural History, New York, USA (AMNH); Department of Entomology, the Natural History Museum, London, United Kingdom (BMNH); Canadian National Collection of Insects, Ottawa, Canada (CNC); Utah State University Insect Collection, Logan, Utah, USA (EMUS); Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (INBC); Coleção Sistemática da Entomologia, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA); Royal Belgian Institute of Natural Sciences, Brussels, Belgium (KBIN); Marc Pollet Collection, Belgium (MPCB); Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZSP); Naturhistorisches Museum, Vienna, Austria (NMW); Staatliches Museum für Tierkunde, Dresden, Germany (SMTD), United States National Museum of Natural History, Washington, DC, USA (USNM).

Label data for primary types are cited verbatim. Labels are listed from top down with data from each label in quotation marks and separated by a semicolon. Lines on labels are delimited by a slash (/) and annotations are placed in square brackets, i.e. []. Non-primary type label data are cited uniformly with latitude and longitude coordinates added in parentheses where necessary.

Morphological terminology mainly follows Cumming and Wood (2009). Terms for male genitalic structures follow Brooks (2005). The following abbreviations are used for morphological terms in the key, diagnoses and descriptions: **I**: foreleg; **II**: midleg; **III**: hindleg; **acr**: acrostichal setae; **ad**: anterodorsal; **apv**: apicoventral; **av**: anteroventral; **bv**: basiventral; **Cx**: coxa; **CuA₁**: 1st anterior branch of cubital vein of wing; **dc**: dorsocentral bristles; **dm-cu**: discal medial-cubital crossvein of wing; **F**: femur; **ial**: intra-alar bristle(s); **M**: medial vein of wing; **npl**: notopleural bristles; **pal**: postalar bristle; **pd**: posterodorsal; **pvt**: posteroventral; **R₂₊₃**: 2nd + 3rd radial vein of wing; **R₄₊₅**: 4th + 5th radial vein of wing; **spal**: supra-alar bristle(s); **su**: sutural intra-alar bristle; **t**: tarsomere(s); **T**: tibia. Body length is measured from the base of the antenna to the tip of abdominal segment 7. Wing length is measured from the humeral crossvein to the wing apex. Macrotrichia are referred to as bristles, setae, setulae, or hairs depending on relative decreasing size.

Male genitalia were macerated in 85% lactic acid heated in a microwave oven and female terminalia were macerated in 10% KOH as outlined in Brooks (2005). Figures showing the male genitalia in lateral view are oriented as they appear on the intact specimen (rotated 180° and lateroflexed to the right) with the morphologically ventral surface of the genitalia facing up, dorsal surface down, anterior end facing right and posterior end facing left. Figures showing aspects of the male genitalia in ventral view are correspondingly oriented with the anterior end facing right and posterior end facing left.

Systematics

Genus *Cheiromyia* Dyte

Cheirocerus Parent, 1930: 13. Type species: *Cheirocerus palmaticornis* Parent [Neotropical], by monotypy. Preoccupied by *Cheirocerus* Eigenmann, 1917 [Pisces].

Cheiromyia Dyte, 1980: 223. Type species: *Cheirocerus palmaticornis* Parent, automatic. Replacement name for *Cheirocerus* Parent, 1930.

Recognition. Males can be easily recognized by their distinctive antenna bearing one to several elongate projections on the outer surface of the postpedicel (Fig. 1), and by the large ventrally projecting apv epandrial

lobe of the male hypopygium, with a pair of long fine setae. Females of the genus are problematic to recognize if not collected with males, and cannot readily be distinguished from females of *Paraclius* Loew.

Redescription. Head: Slightly to distinctly broader than high. Vertex slightly to distinctly excavated; 1 pair of strong, inclinate vertical bristles; 1 pair of strong, divergent ocellar bristles; 1 pair of paravertical bristles, subequal to distinctly stronger than uppermost postoculars; postocular setae uniseriate. Face height much greater than height of clypeus. Clypeus subquadrate to subrectangular, lower margin truncate, ending well above lower eye margin. Antenna: scape somewhat enlarged in males, setose dorsally; pedicel somewhat flattened and distorted in males, with marginal setae; male postpedicel modified and elongate with pointed apex and 1 to several elongate projections on the outer surface (Fig. 1); female postpedicel unmodified, short, subtriangular, lacking projections; stylus 2-articled, arista-like. **Thorax:** Scutum: acr biserial; 6 dc (anterior bristle usually weak), 1 presutural ial, 1 su, 1 strong outer presutural spal, 1 weaker inner presutural spal, 2 postsutural spal, 1 pal and setula, and 2 npl on each side. Scutellum: 1 strong medial bristle and 1 short lateral bristle on each side. Postpronotum with 1 mediocline bristle and 1-2 weak setae below. Upper proepisternum in front of anterior spiracle with patch of fine hairs, lower proepisternum with 1 strong mediocline proepisternal bristle and patch of fine hairs medially; pleural surface in front of posterior spiracle bare; metepisternum with a row of 2-3 fine hairs. **Legs:** I: CxI: anterior surface with dark setulae, 3 strong setae on lateral margin and several long setulae on apical margin; FI with series of 2-4 apical pv setae increasing in size distally, distalmost seta usually distinctly stronger in *C. palmaticornis*; TI with 2 dorsal, 1-2 ad and 2 apical (1 dorsal, 1 posterior) bristles, with comb-like row of ad setae (weaker in males); tarsus I longer than TI, It_{1-5} usually decreasing in length distally (It_2 shorter than It_3 in males of *C. brevitaris* and *C. laselva*) (Fig. 4A). II: CxII: anterior surface with dark setulae and setae, 1 stronger seta near outer margin; FII with 1 strong ad preapical bristle, with series of apical pv setae increasing in size distally, distalmost seta sometimes distinctly stronger; TII with 4 ad, 3-4 pd, 2 ventral and 5 apical bristles; tarsus II slightly longer than TII, IIt_{1-5} decreasing in length distally. III: CxIII with strong lateral seta near apex; FIII with 1 strong ad preapical bristle; TIII usually with 4 ad (3 in *C. palmaticornis*), 3 pd, 1 preapical dorsal, 1 weak ventral and 2 apical bristles; tarsus III subequal to or longer than TIII, $IIIIt_1$ shorter than $IIIIt_2$ with distinct basiventral seta, $IIIIt_{2-5}$ decreasing in length distally. **Wing** (Figs. 2D,E): Hyaline or with brownish tint; R_{2+3} weakly sinuous basally, straight in distal section; R_{4+5} straight, sometimes with a weak posterior curve in distal section; distal section of M beyond dm-cu with strong anterior bend near middle ending above wing apex; crossvein dm-cu subequal to, or longer than distal section of CuA_1 ; calypter with black setae; halter pale. **Abdomen:** Subconical; tergites 1-5 setose. Male: tergite 6 bare; sternite 2 unmodified; sternite 3 unmodified to emarginate and membranous posteromedially; sternite 4 strongly emarginate and membranous posteromedially, sometimes divided; sternite 5 mainly membranous, apparently with paired tubular eversible sacs (observed in some specimens); sternite 6 mainly membranous, weakly sclerotized along anterior margin; segment 7 forming tubular peduncle; sternite 8 ovoid to teardrop-shaped, setose. **Hypopygium** (Figs. 3, 4B-D, 5,6,7): Epandrium subrectangular in lateral view, bv epandrial lobe present or absent (as indicated by bv seta), apv epandrial lobe well-developed, projecting ventrally with a pair of long fine setae, left and right bv and apv epandrial lobes with varying degrees of asymmetry; surstylus divided into digitiform dorsal and ventral arms; postgonite digitiform (upturned in *C. palmaticornis*); cercus large, shape various; hypandrium simple, trough-like; sperm pump folded back on itself, with simple single fold, opposing surfaces tightly appressed; phallus tubular, enlarged preapically with dorsal flap-like process, apex narrow; ejaculatory apodeme rather narrow and elongate. Female: Sternites 2-5 setose, unmodified; segments 6-8 bare, tergites and sternites of segments 6 and 7 undivided; tergite 8 and sternite 8 divided medially, tergite and sternite fused anterolaterally forming a narrow sclerite. Tergite 10 divided medially into hemitergites each bearing 5 spines, spines rounded and somewhat flattened apically.

Distribution. *Cheiromyia* is now known from Central America (Costa Rica), Ecuador, Colombia, Brazil (Acre, Amapá, Amazonas, Roraima, Pará, Maranhão, Sergipe, Pernambuco), Guyana, Surinam, French Guiana and Bolivia (La Paz) (Fig. 8).

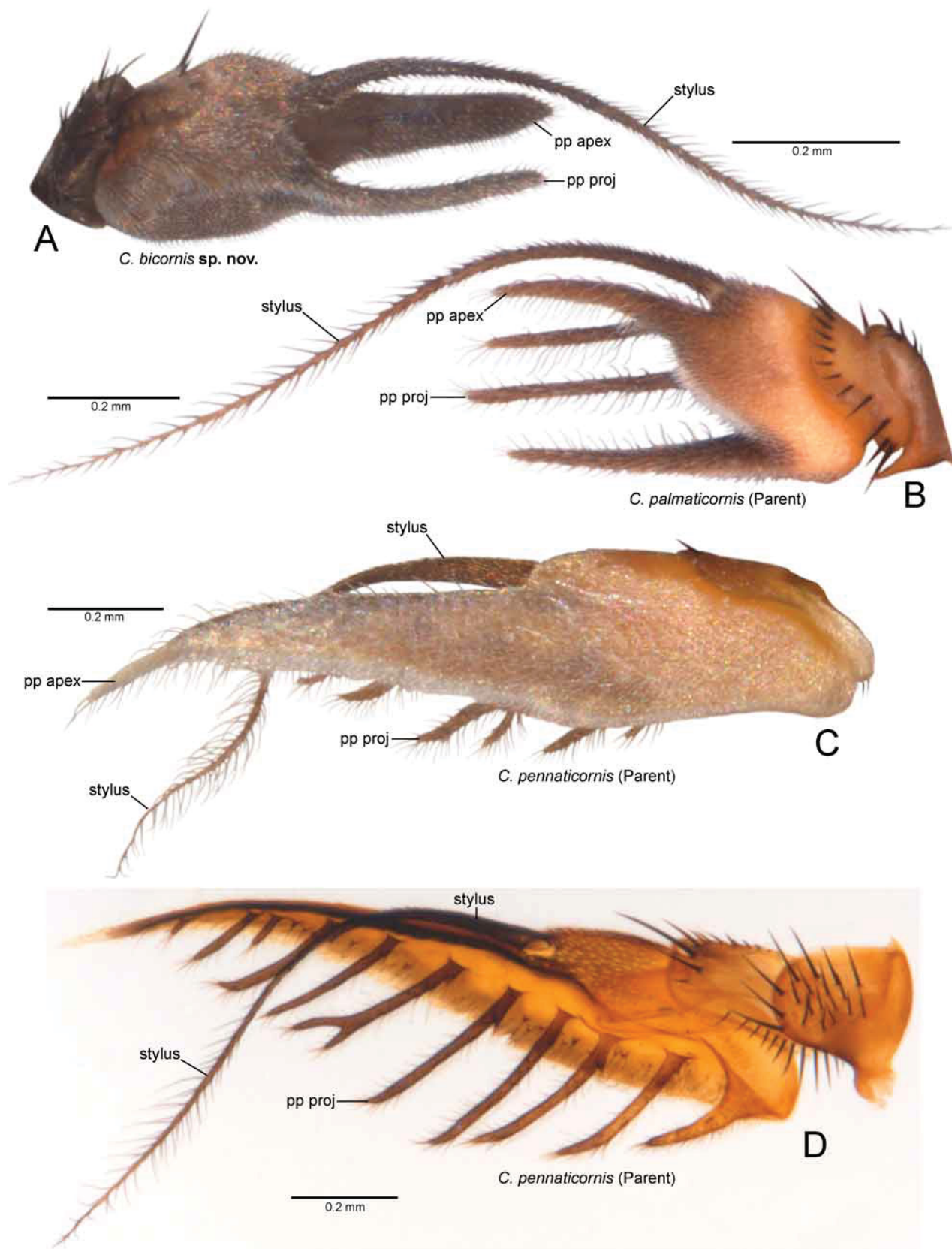


FIGURE 1. Male antenna: (A) *Cheiromyia bicornis* Brooks **sp. nov.** left antenna (outer surface); (B) *C. palmaticornis* (Parent) right antenna (medial surface); (C) *C. pennaticornis* (Parent) right antenna (medial surface) of holotype; (D) *C. pennaticornis* (Parent) slide preparation of left antenna (outer surface). Abbreviations: pp apex: postpedicel apex; pp proj: postpedicel projection.

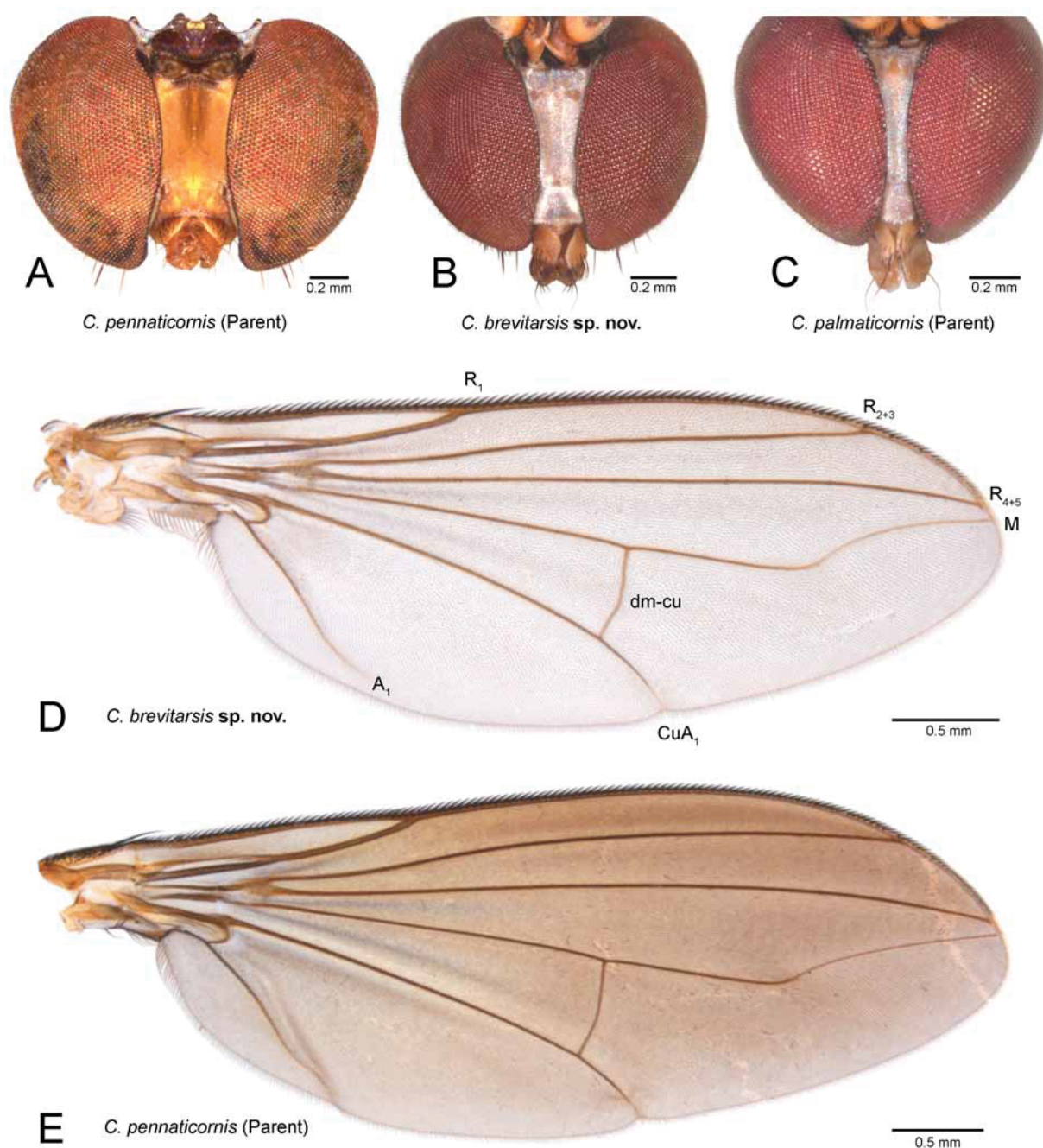


FIGURE 2. Male face and wing: (A) *Cheiromyia pennaticornis* (Parent); (B) *C. brevatarsis* Brooks **sp. nov.**; (C) *C. palmaticornis* (Parent); (D) *C. brevatarsis* Brooks **sp. nov.**; (E) *C. pennaticornis* (Parent). Abbreviations: A_1 : anal vein of wing; CuA_1 : 1st anterior branch of cubital vein of wing; dm-cu: discal medial-cubital crossvein of wing; R_1 : 1st radial vein of wing; R_{2+3} : 2nd + 3rd radial vein of wing; R_{4+5} : 4th + 5th radial vein of wing.

Remarks. Capellari and Amorim (2009, figs. 11,12) recently described and illustrated the female terminalia of *Cheiromyia brevatarsis* Brooks **sp. nov.** (described below), and noted the proximal fusion of sternite 8 and tergite 8 (character state 70.1 in Brooks 2005). We have also observed this feature in the previously unknown female of the type species, *C. palmaticornis*. As stated by Capellari and Amorim (2009), the presence of this character state supports the inclusion of *Cheiromyia* in a clade with *Pelastoneurus* Loew, *Stenopygium* Becker, *Platyopsis* Parent, and *Paraclius* Loew (in part), including the *P. arcuatus* lineage (see Brooks 2005, fig. 2).

Key to species of *Cheiromyia* (males)

- 1 Postpedicel with one elongate projection on outer surface (Fig. 1A); antennal color entirely dark brown; face dark brown and narrow; femora infuscated (Fig. 3B) (Brazil: Amazonas) *bicornis* Brooks **sp. nov.**
- Postpedicel with several digitiform projections on outer surface (Figs. 1B–D); scape, pedicel and base of postpedicel pale, at most infuscated dorsally; face silvery white or opaque yellow, width various (Figs. 2A–C); femora pale 2
- 2 Postpedicel triangular and elongate, about 4x as long as wide (Figs. 1C,D), evenly tapering to apex, with 10–11 digitiform projections on outer surface; face opaque yellow, broad (Fig. 2A); wing with brownish tint (Fig. 2E) (Bolivia, Brazil) *pennaticornis* (Parent)
- Postpedicel subovoid basally with narrowed elongate apex, about 2x as long as wide, with 3–5 digitiform projections on outer surface (Fig. 1B); face silver, relatively narrow (Figs. 2B,C); wing hyaline (Fig. 2D) 3
- 3 TI not swollen, tarsus I lacking pronounced outward bend, It_2 slightly longer than It_3 , It_{3-4} lacking row of erect setae on inner margin; cercus triangular, large (Fig. 6A); face narrow (Fig. 2C) (Ecuador, Brazil, Surinam, French Guiana) *palmaticornis* (Parent)
- TI slightly swollen, tarsus I with pronounced outward bend and It_2 shorter than It_3 (Fig. 4A), It_{3-4} with row of erect setae on inner margin, setae more closely set on It_4 ; cercus ovoid or subquadrate (Figs. 4B, 5A); face wider (Fig. 2B) 4
- 4 Left apv epandrial lobe lacking acute apicodorsal projection; (Fig. 4B); face relatively narrow (Fig. 2B) (Colombia, Guyana, French Guiana, Brazil) *brevitarsis* Brooks **sp. nov.**
- Left apv epandrial lobe with acute apicodorsal projection (Fig. 5A); face wider (Costa Rica) *laselva* Brooks **sp. nov.**

Cheiromyia bicornis Brooks **sp. nov.**

(Figs. 1A, 3A–C, 8A)

Recognition (male). This species is easily recognized by the following features: postpedicel with one digitiform projection on outer surface; antenna entirely dark brown; face dark brown and narrow; femora infuscated.

Description. Male: Body length: 3.2 mm, wing length: 3.0 mm. **Head:** Postocular setae: apparently all black (obscured in unique holotype). Frons subrectangular (wider than high), dark with violet and blue-green metallic reflections. Face dark brown, opaque, narrow (cf. Fig. 2C), sides convergent below. Clypeus subquadrate with upper part pale and lower margin dark brown. Palpus pale brown, with short setulae on outer surface. Proboscis without close-set row of 3 fine elongate hairs on anterior surface of each labellar lobe. Antenna (Fig. 1A) entirely dark brown; scape obconical, with acute medial process; pedicel short; postpedicel ovoid basally with digitiform apex, outer surface with single elongate digitiform projection extending to apex of postpedicel; stylus mid-dorsal, basal article elongate, extending to tip of postpedicel, distal article strongly pubescent. **Thorax:** Scutum metallic violet and greenish blue. Scutellum metallic violet with greenish-blue reflections. Mesopleuron dark metallic brownish with light gray pruinosity, anepisternum with metallic green reflections. **Legs:** Coxae mainly dark; femora infuscated, smoky with pale yellow ground coloration; tibiae and tarsi pale. I: TI not swollen; It_{1-5} decreasing in length distally, It_{2-4} with pale velvety pile on anterior surface, inner claw longer sigmoidal. II: CxII: mainly dark, tip of anterior surface pale, FII with av setulae slightly longer than other femoral setulae. III: FIII with av row of setulae distinctly stronger than other femoral setulae. **Wing:** Hyaline; M with weak arc beyond bend similar to *C. palmaticornis* and *C. pennaticornis* (cf. Fig. 2E). **Abdomen:** Tergites 1–5 dark metallic bluish-black, with silverish pruinosity laterally. **Hypopygium** (Figs. 3A–C): Epandrium with left bv epandrial lobe short, rounded apically with bv epandrial seta on medial surface, right bv epandrial lobe scarcely developed as slightly raised area at base of bv epandrial seta; apv epandrial lobe projecting ventrally with narrow pointed apex, with 2 long lateral setae, base of lobe with bulging weakly sclerotized to membranous area medially, left and right lobes largely symmetrical. Surstylus: dorsal arm with sac-like medioventral lobe, with curved thumb-like dorsal process bearing subapical seta, apex with microtrichia ventrally; ventral arm with narrow apex bearing 2 stout setae, with medially produced subapical crest. Postgonite digitiform, somewhat laterally compressed. Cercus mainly

dark, pale basally, ovoid, with rather long seta on apical margin. Hypandrium widened near middle. Phallus strongly widened preapically. Ejaculatory apodeme with ventral curve. **Female:** Unknown.

Type material. **HOLOTYPE** ♂ from Brazil, labelled: “BRASIL, Acre, Cru-/ zeiro do Sul, Rio Moa/ 073702S-724615W [07°37'02"S 72°46'15"W]/ 19–28.xi.1996”; “Varredura/ Mata”; “J.A.Raphael; J.Vidal/ & R.L.Menezes”; “HOLOTYPE/ *Cheiromyia bicornis*/ Brooks” [red label] (INPA).

Distribution. *Cheiromyia bicornis* is only known from the holotype which was collected along the Rio Moa, in Cruzeiro do Sul, in the western Brazilian state of Acre (Fig. 8A).

Etymology. The new species name is derived from the Latin *bi* (two) and the Latin *cornu* (horn), and refers to the two-pronged structure of the male postpedicel.

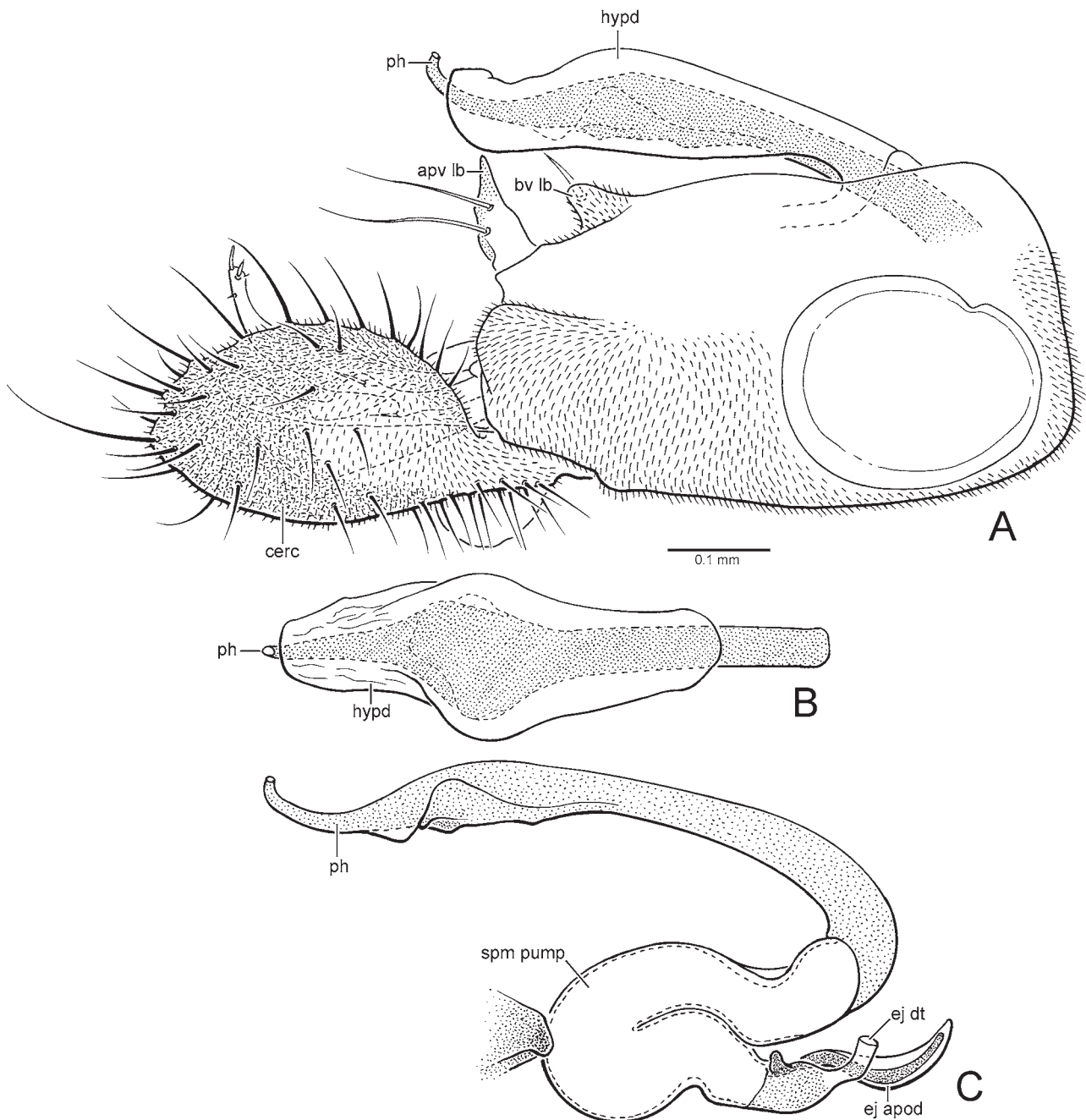


FIGURE 3. *Cheiromyia bicornis* Brooks **sp. nov.** male terminalia: (A) hypopygium (left lateral view); (B) hypandrium and phallus (ventral view); (C) sperm pump and phallus (left lateral view). Abbreviations: apv lb: apicoventral epandrial lobe; bv lb: basiventral epandrial lobe; cerc: cercus; ej dt: ejaculatory duct; ej apod: ejaculatory apodeme; hypd: hypandrium; ph: phallus; spm pump: sperm pump.

***Cheiromyia brevitorsis* Brooks sp. nov.**

(Figs. 2D, 4A–D, 8A)

Recognition (male). This species can be distinguished based on the following combination of characters: postpedicel subovoid basally with narrow elongate apical projection and 3–5 pubescent digitiform projections on outer surface (cf. Fig. 1B); TI slightly swollen, tarsus I with It_2 shorter than It_3 , It_{3-4} with row of erect setae on inner margin (Fig. 4A); left apv epandrial lobe lacking acute apicodorsal process (Fig. 4B). This species is very similar to *C. laselva* Brooks **sp. nov.** (see description below and Fig. 5).

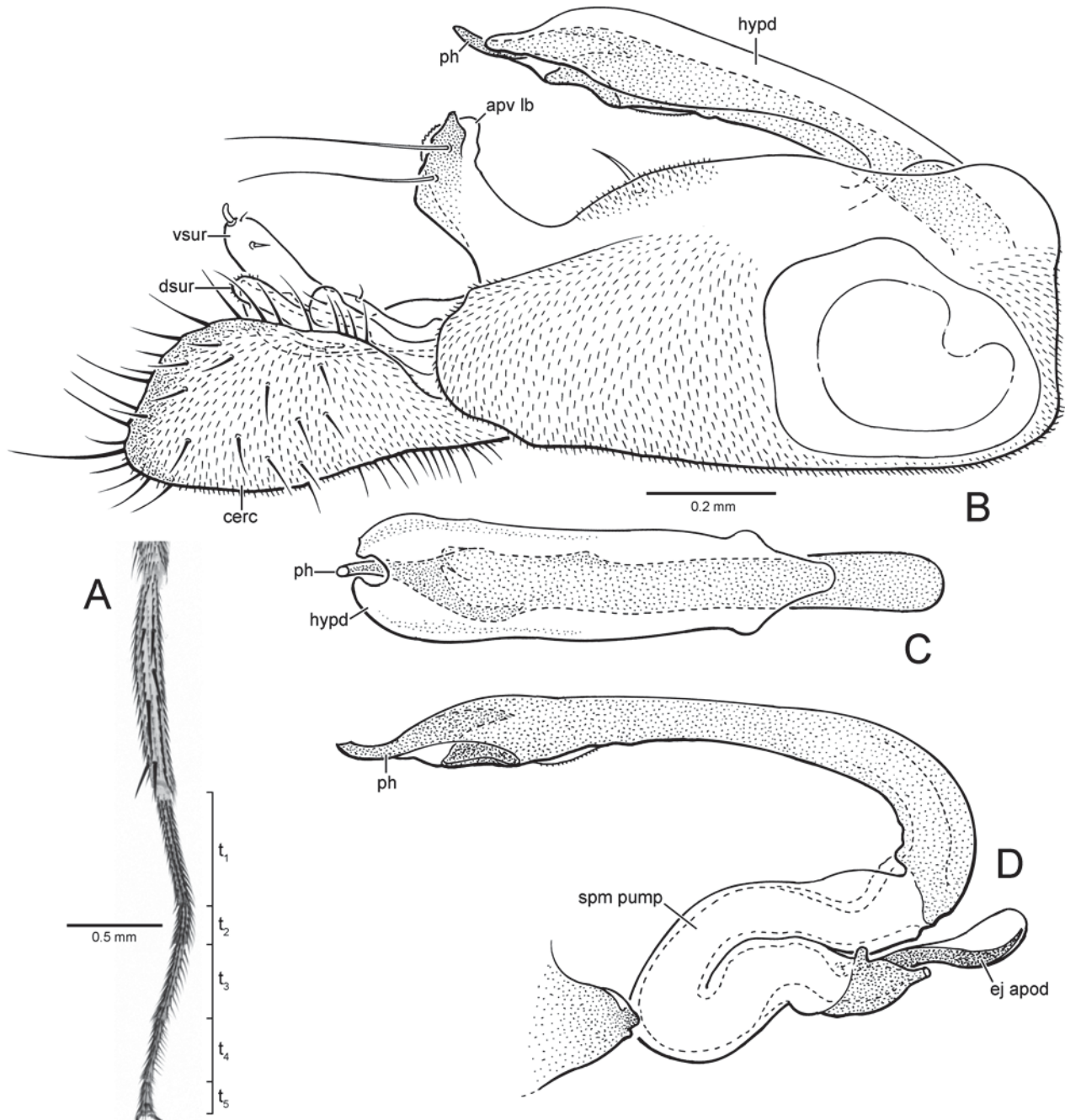


FIGURE 4. *Cheiromyia brevitorsis* Brooks **sp. nov.** male foreleg and terminalia: (A) tibia and tarsus of right foreleg; (B) hypopygium (left lateral view); (C) hypandrium and phallus (ventral view); (D) sperm pump and phallus (left lateral view). Abbreviations: apv lb: apicoventral epandrial lobe; cerc: cercus; dsur: dorsal arm of surstylus; ej apod: ejaculatory apodeme; hypd: hypandrium; ph: phallus; spm pump: sperm pump; t: tarsomere; vsur: ventral arm of surstylus.

Description. Male: Body length: 3.8–4.2 mm, wing length: 3.2–3.5 mm. **Head:** Postocular setae: upper 5–7 dark, lower setae pale, lowermost seta dark brownish or pale. Frons subrectangular (wider than high), dark with blue-green and violet metallic reflections. Face silvery white, relatively broad (Fig. 2B), sides convergent below. Clypeus concolorous with face, subquadrate, lower margin slightly wider. Palpus pale, ovoid, bare above, with several fine long setulae on lower edge. Proboscis: anterior surface of each labellar lobe with close-set row of 3 fine elongate hairs. Antenna: similar to *C. laselva* and *C. palmaticornis* (cf. Fig. 1B), scape, pedicel and base of postpedicel pale, apical part of postpedicel and stylus dark; scape obconical, with acute medial and ventral process; pedicel short; postpedicel ovoid basally with digitiform, pubescent apex, outer surface with 3–5 pubescent digitiform projections, basalmost projection broader, projections occasionally bifurcate; stylus dorsal, before middle of dorsal margin of postpedicel, basal article elongate, extending to tip of postpedicel, distal article strongly pubescent. **Thorax:** Scutum metallic green with blue and violet or coppery reflections, dark bronze patch above notopleuron immediately posterior to suture. Scutellum concolorous with scutum. Mesopleuron gray pruinose with dark often brownish background coloration with metallic green and violet reflections. **Legs:** Mainly pale except as noted below. I: (Fig. 4A) CxI usually pale, sometimes infuscated; TI slightly swollen; tarsus I with pronounced outward bend, It_2 shorter than It_3 , It_{3-4} with row of erect setae on inner margin, setae more closely set on It_4 , It_{3-5} with pale velvety pile on ventral surface, claws enlarged and stout (often crossed in preserved specimens). II: CxII with lateral surface and outer margin of anterior surface dark; tarsus II weakly infuscate from tip of III_{1-5} . III: CxIII with lateral surface pale to dark; tarsus III weakly infuscate from tip of III_{1-5} . **Wing:** Hyaline; with pronounced arc beyond bend (Fig. 2D), similar to *C. laselva*. **Abdomen:** Tergites 1–5 metallic green, with silverish pruinosity laterally. **Hypopygium** (Figs. 4B–D): Epandrium with bv epandrial lobe not developed; apv epandrial lobe projecting ventrally, subrectangular, with 2 long apicolateral setae, apicolateral margin forming a darkened crest, narrowing to dentiform process apicoventrally, medial surface with bulging weakly sclerotized to membranous lobe, left and right apv epandrial lobes slightly asymmetrical, left lobe longer. Surstylus: dorsal arm with sac-like medioventral lobe, with short finger-like dorsal process bearing apical seta, apex with microtrichia ventrally; ventral arm with stout curved apical seta, apex rounded, subapical crest present. Postgonite digitiform. Cercus mainly pale with dark outer margin, subovoid, apical margin somewhat truncate. Hypandrium with medial notch apically. Phallus slightly widened preapically, preapical flap-like dorsal process with weak longitudinal serrate ridges basally. Ejaculatory apodeme with weak ventral curve. **Female:** Similar to male except as follows: Face and clypeus broader, face parallel-sided. Palpus with only short setulae and 1 strong apical seta. Proboscis lacking close-set row of long hairs on anterior surface of each labellar lobe. Antenna unmodified, postpedicel lacking projections, about as long as wide, apex acute. TI not swollen; tarsus I lacking distinct outward bend; It_2 subequal to slightly longer than It_3 ; It_{3-4} lacking distinct row of erect setae on inner margin; It_{3-5} lacking velvety pile ventrally; claws normally developed. Terminalia as in generic description.

Type material. HOLOTYPE ♂, labelled: “FRENCH GUIANA: Sinnamary/ (Commune), Sinnamary, Pointe/ Combi [05°18'N 52°56'W], 1–31.x.2000, rainforest/ MT, Philippe Cerdan/ FRGY/2000/008”; “HOLOTYPE/ *Cheiromyia brevitaris*/ Brooks” [red label] (CNC). **PARATYPES: BRAZIL:** 1♂ Amapá, Serra do Navio (00°53'45"N 52°00'07"W), 30.ix.1957, J. Lane (MZSP); 1♂ Amazonas, Manaus (03°06'S 60°01'W), INPA-V8, 17.v.1982, J.A. Rafael (INPA); 1♂, 2♀ Amazonas, Manaus, Puraquequara (03°03'S 59°51'W), Prato Amarelo, xi.1998, J. Vidal (INPA); 1♂ Maranhão, Carolina (07°20'S 47°28'W), Rio Lages, 12.xii.2001, J.A. Raphael, F.L. Oliveira, & J. Vidal, Malaise trap (INPA); 1♂ Pará, Barreirinhas (ca. 04°25'S, 56°13'W), Rio Tapajós, x–xi.1970, Exp. Perm. Amaz. (MZSP); 1♂ Pará, Faz. Taperinha (02°31'S 54°17'W), near Santarém, 1–11.ii.1968, Exp. Perm. Amaz. (MZSP); 2♂ Pará, Tucuruí, Morro do senador, 03°59'23"S 49°44'45"W, xii.2001, Malaise, J.A. Rafael & J. Vidal; 3♂ Roraima, Rio Uraricoera, Ilha de Maraca (ca. 03°22'N 61°25'W), 2–13.v.1987, Malaise trap, J.A. Rafael, J.E.B. Brasil, L.S. Aquino (INPA), 2♂ same except 18–28.vii.1987, J.A. Rafael, L.S. Aquino, J.F. Vidal, Elias Binda (INPA), 1♂ same except Shannon trap (INPA). **COLOMBIA:** 1♂ Meta, PNN Tinigua, Caño Nevera (2°11'N 73°48'W), 390 m, 20–23.xii.2001,

Malaise trap, D. Campos (CO/2620) (MPCB). **GUYANA:** 1♂ Kanuku Mountains, Kumu River & Falls (3°15.9'N 59°43.5'W), 28–30.iv.1995, Wayne N. Mathis (USNM); 1♂ Mazaruni, 2nd Growth (Low Forest), 25.viii.1937, Richards & Smart, B.M. 1937–776, prey of asilid *Ommatius marginellus* (Fabricius) (BMNH); 1♂ Mazaruni, clearing, in colony house, 27.viii.1937, Richards & Smart, B.M. 1937–776 (BMNH). **FRENCH GUIANA:** 2♂ same as holotype except 3–24.x.2000, FRGY/2000/007 (CNC); 1♂ Sinnamary (Commune), Sinnamary, Petit Saut (05°11'N 52°51'W), 1–31.x.2000, Malaise trap, Philippe Cerdan, FRGY/2000/010B (CNC); 1♂ Kourou (Commune), Kourou (05°09'N 52°38'W), Piste Soumourou, 1–30.xi.2002, Malaise trap, D. Fauré, FRGY/2002/009B (MPCB).

Distribution. *Cheiromyia brevitarsis* is known from northern South America, including Colombia, Guyana, French Guiana, and the Brazilian states Amapá, Amazonas, Maranhão, Pará, Pernambuco, Roraima and Sergipe (see Capellari & Amorim 2009) (Fig. 8A).

Remarks. As noted in Brooks (2005), the two BMNH specimens mentioned by Dyte (1980) determined as *C. palmaticornis* belong to this species. The male and female terminalia of this species were recently illustrated by Capellari and Amorim (2009, figs. 11–14) as *Cheiromyia* sp.

Etymology. The new species name is derived from the Latin *brevis* (short) and Greek *tarsos* (heel), referring to It_2 which is shorter than It_3 .

Cheiromyia laselva Brooks sp. nov.

(Figs. 5A–D, 8B)

Recognition (male). This species is very similar to *C. brevitarsis* Brooks sp. nov. (see above), but can be distinguished from that species based on the following features: left apv epandrial lobe with acute apicodorsal process (Fig. 5A); face slightly wider.

Description. Male: Body length: 4.6 mm, wing length: 3.8–3.9 mm. **Head:** Postocular setae: upper 5–7 dark, lower setae pale, lowermost 1–2 setae dark. Frons subrectangular (wider than high), dark with blue-green and violet metallic reflections. Face silvery white, relatively broad (slightly wider than *C. brevitarsis*, cf. Fig. 2B), sides convergent below. Clypeus concolorous with face, subquadrate. Palpus pale, ovoid, bare above, with several fine elongate setulae on lower edge. Proboscis: anterior surface of each labellar lobe with close-set row of 3 fine elongate hairs. Antenna: similar to *C. brevitarsis* and *C. palmaticornis* (cf. Fig. 1B), scape, pedicel and base of postpedicel pale, apical part of postpedicel and stylus dark; scape obconical, with acute medial and ventral process; pedicel short; postpedicel ovoid basally with digitiform, pubescent apex, outer surface with 5 pubescent digitiform projections, basalmost projection broader, projections occasionally bifurcate; stylus dorsal, before middle of dorsal margin of postpedicel, basal article elongate, extending to tip of postpedicel, distal article strongly pubescent. **Thorax:** Scutum mainly metallic green with violet reflections or vice versa, dark bronze area above notopleuron immediately posterior to suture. Scutellum mainly metallic green with violet reflections or vice-versa. Mesopleuron gray pruinose with brownish background coloration and metallic green reflections. **Legs:** Mainly pale except as noted below. I: CxI infusate; TI slightly swollen; tarsus I with pronounced outward bend, It_2 shorter than It_3 , It_{3-4} with row of erect setae on inner margin, setae more closely set on It_4 , It_{3-5} with pale velvety pile on ventral surface, claws enlarged and stout (often crossed in preserved specimens). II: CxII with lateral surface and outer margin of anterior surface dark; tarsus II weakly infusate from tip of III_{1-5} . III: CxIII with lateral surface dark; tarsus III weakly infusate from tip of III_{1-5} . **Wing:** Hyaline; with pronounced arc beyond bend, similar to *C. brevitarsis* (cf. Fig. 2D). **Abdomen:** Tergites 1–5 metallic green, with silverish pruinosity laterally. **Hypopygium** (Figs. 5A–D): Epandrium with bv epandrial lobe not developed; apv epandrial lobe projecting ventrally, with 2 long apicolateral setae, apicolateral margin forming a darkened crest narrowing to dentiform process apicoventrally, medial surface with bulging weakly sclerotized to membranous lobe, left apv epandrial lobe broader and longer than right lobe with acute apicodorsal projection, right lobe without with acute apicodorsal projection. Surstylus: dorsal

arm with sac-like medioventral lobe, with short finger-like dorsal process bearing apical seta, apex with microtrichia ventrally; ventral arm with stout curved apical seta, subapical crest present. Postgonite digitiform. Cercus mainly pale with dark outer margin, subquadrate. Hypandrium with medial notch apically. Phallus slightly widened preapically, preapical flap-like dorsal process with weak longitudinal serrate ridges basally. Ejaculatory apodeme straight. **Female:** Unknown.

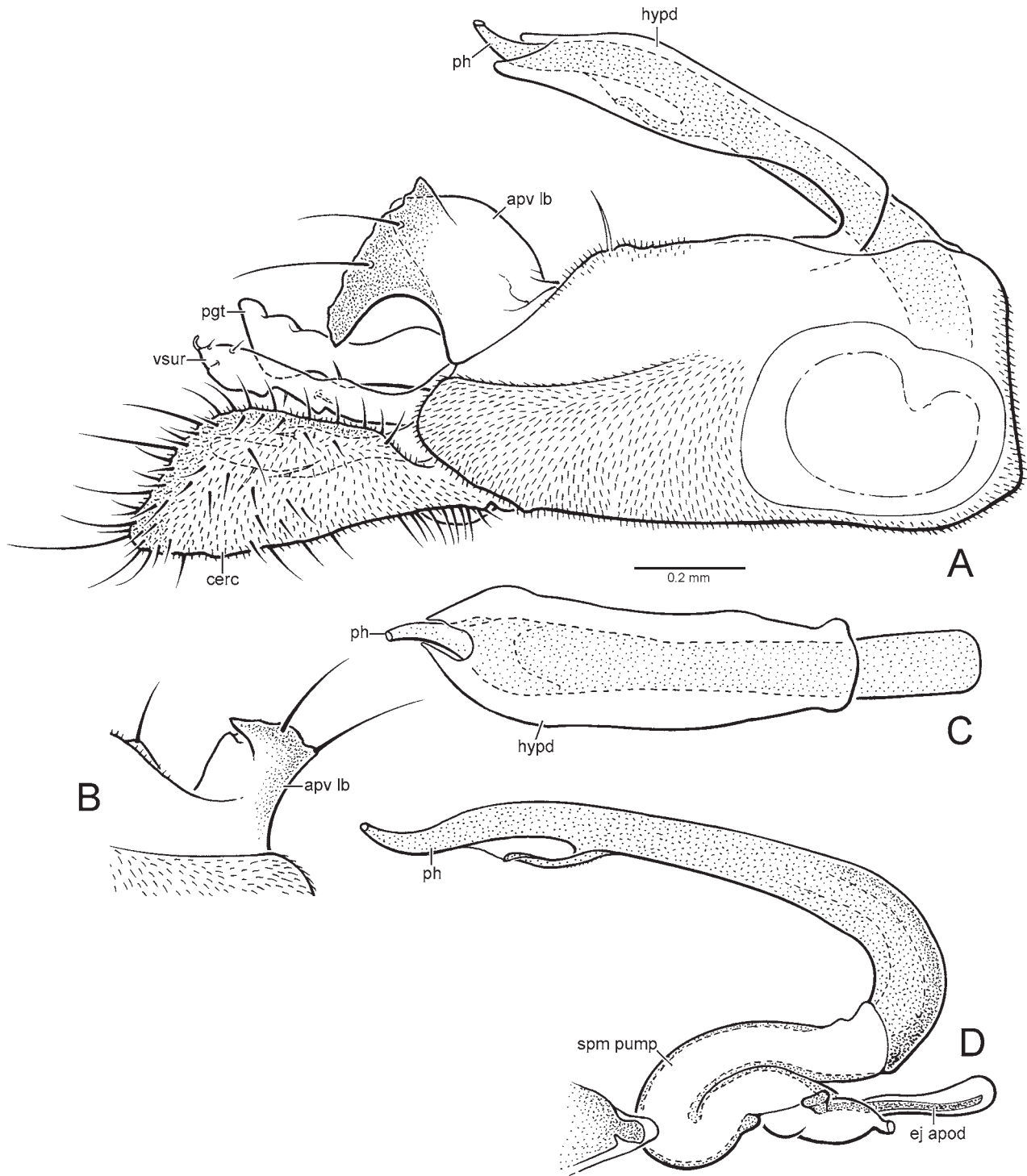


FIGURE 5. *Cheiromyia laselva* Brooks **sp. nov.** male terminalia: (A) hypopygium (left lateral view); (B) portion of epandrium showing right apicoventral epandrial lobe (right lateral view); (C) hypandrium and phallus (ventral view); (D) sperm pump and phallus (left lateral view). Abbreviations: apv lb: apicoventral epandrial lobe; cerc: cercus; ej apod: ejaculatory apodeme; hypd: hypandrium; pgt: postgonite; ph: phallus; spm pump: sperm pump; vsur: ventral arm of surstylus.

Type material. **HOLOTYPE** ♂, labelled: “COSTA RICA: Heredia,/ La Selva Biological Station/ 10°26'N 84°01'W, 50–150m,/ INBio-OET, 15.vii.1993/ M/02/153”; “HOLOTYPE/ *Cheiromyia laselva*/ Brooks” [red label] (INBC). **PARATYPE: COSTA RICA:** 1♂ Heredia, La Selva Research Station, 11–17.vi.1986, W. Hanson, G. Bohart (EMUS).

Distribution. *Cheiromyia laselva* is only known from the holotype and paratype, both of which were collected at La Selva Biological Station (Fig. 8B).

Remarks. The morphological differences between *C. laselva* and *C. brevitarsis* are slight, but in our opinion, consistent and sufficient enough to warrant the recognition of two separate species.

Etymology. This new species name is derived from La Selva Biological Station, where the type series was collected.

***Cheiromyia palmaticornis* (Parent)**

(Figs. 1B, 2C, 6A–C, 8B)

Cheirocerus palmaticornis Parent, 1930: 13.

Cheiromyia palmaticornis (Parent): Dyte 1980: 223.

Recognition. Males of this species can be recognized by the following features: postpedicel subovoid basally with narrow elongate apical projection and 3–5 pubescent digitiform projections on outer surface; cercus large, triangular; face narrow. Females have similar body coloration to that of males and possess a proepisternal bristle with a fine curved tip, also similar to that of males.

Redescription. Male: Body length: 3.6–4.1 mm, wing length: 2.5–3.1 mm. **Head:** Postocular setae: upper 5–7 dark, lower setae pale, lowermost seta dark and stronger. Frons subrectangular (wider than high), dark with blue-green and violet reflections. Face silvery white, narrow (Fig. 2C), sides convergent below. Clypeus concolorous with face, relatively narrow (higher than wide). Palpus pale, with strong apical seta and short weak setulae on outer surface. Proboscis without close-set row of 3 fine elongate hairs on anterior surface of each labellar lobe. Antenna (Fig. 1B): scape, pedicel and base of postpedicel pale, apical part of postpedicel and stylus dark; scape obconical, with acute medial and ventral process; pedicel short; postpedicel ovoid basally with digitiform, pubescent apex, outer surface with 3–5 pubescent digitiform projections, basalmost projection broader (usually longer than in *C. brevitarsis* and *C. laselva*), projections occasionally bifurcate; stylus dorsal, before middle of dorsal margin of postpedicel, basal article elongate, extending to tip of postpedicel, distal article strongly pubescent. **Thorax:** Scutum metallic green with violet reflections, often with coppery reflections anteriorly, bronze-brown laterally above notopleuron. Scutellum mainly metallic green, bronze-brown laterad medial scutellar bristle. Proepisternal bristle long with fine curved tip. Mesopleuron gray pruinose, with dark often brownish background coloration and metallic reflections. **Legs:** Mainly pale except as noted below. I: TI not swollen; It_{1–5} decreasing in length distally, lacking velvety pile on ventral or anterior surface, claws normally developed. II: CxII with lateral surface and outer margin of anterior surface weakly infusate, lateral surface often weakly pruinose; FII with av row of setulae, stronger than other femoral setulae; tarsus II weakly infusate from tip of IIIt_{1–5}. III: CxIII with lateral surface weakly pruinose; FIII with av setulae slightly stronger than other femoral setulae; tarsus III weakly infusate from tip of IIIIt_{1–5}. **Wing:** Hyaline; with weak arc beyond bend similar to *C. bicornis* and *C. pennaticornis* (cf. Fig. 2E). **Abdomen:** Tergites 1–5 blackish to dark brown with metallic green reflections, with silverish pruinosity laterally. **Hypopygium** (Figs. 6A–C): Epandrium with left bv lobe bump-like, with dentiform projection immediately distad bv epandrial seta, right bv lobe not developed, lacking dentiform projection distad bv epandrial seta; apv epandrial lobe elongate, projecting ventrally, with 2 long apicolateral setae, lateral surface darkened, anterior and posterior margins keel-like, medial surface with bulging weakly sclerotized to membranous area, left and right lobes asymmetrical, right lobe with narrow elongate posterior projection. Surstylus: dorsal and ventral arm elongate; dorsal arm with broad sac-like medioventral lobe, with short

dorsal finger-like projection bearing apical seta, apex with microtrichia ventrally; ventral arm with narrow ventrally curved apex bearing tooth-like seta, with subapical crest. Postgonite elongate, upturned with narrow tip. Cercus mainly pale with dark outer margin, greatly enlarged, triangular, with strong elongate marginal setae. Hypandrium widened apically, apex with medial notch. Phallus strongly widened preapically. Ejaculatory apodeme with ventral curve. **Female:** Similar to male except as follows: Face and clypeus broader, clypeus subquadrate. Antenna unmodified, postpedicel lacking projections, about as long as wide, apex acute. FII and FIII with av row of setulae not as strongly developed. Terminalia as in generic description.

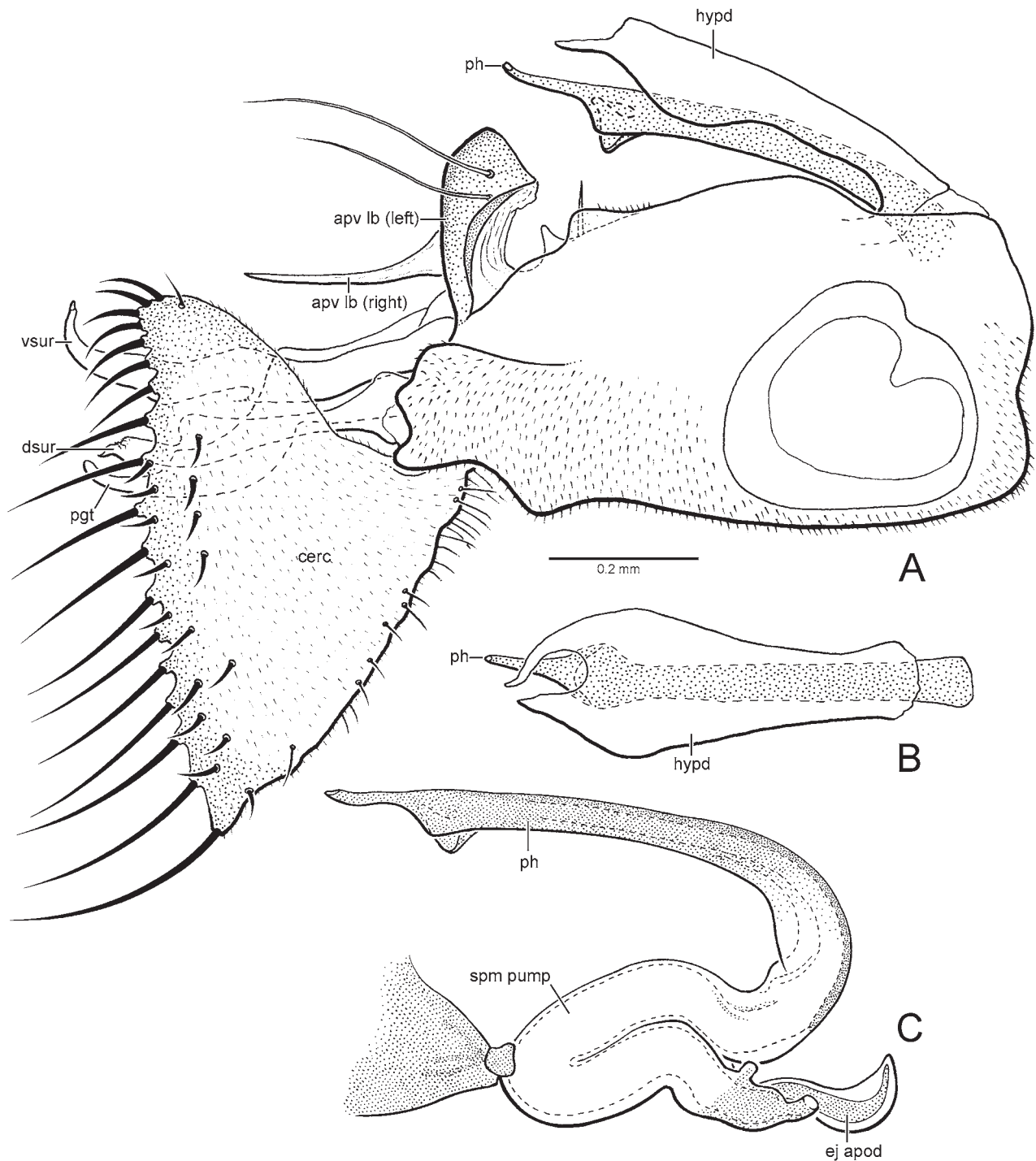


FIGURE 6. *Cheiromyia palmaticornis* (Parent) male terminalia: (A) hypopygium (left lateral view); (B) hypandrium and phallus (ventral view); (C) sperm pump and phallus (left lateral view). Abbreviations: apv lb: apicoventral epandrial lobe; cerc: cercus; dsur: dorsal arm of surstylus; ej apod: ejaculatory apodeme; hypd: hypandrium; pgd: postgonite; ph: phallus; spm pump: sperm pump; vsur: ventral arm of surstylus.

Type material examined. HOLOTYPE ♂ from Pará, Brazil, labelled: “Unt. Amaz. Tape-/rinha [02°31'S 54°17'W] b. Santarem/ 1.–10.VI.'27.Zerny”; “Type” [red label]; “Cheirocerus/ palmaticornis/ nov. gen./ nov. spec./ O. Parent” (NMW).

Additional material examined. BRAZIL: 1♂ Amapá, Serra do Navio (00°53'45"N 52°00'07"W), ix.1957, J. Lane (MZSP); 1♂ Pará, Belém, Irituia (01°46'28"S 47°26'28"W), xii.1959, L. Gomes. **ECUADOR:** 1♂ Orellana (as “Napo”): Res. Ethnica Waorani, 1 km S. Onkone Gare Camp (00°38'S 76°36'W), Trans. Ent., 220m, 24.i.1994, T.L. Irwin et al. Insecticidal fogging of mostly bare green leaves some with covering of lichenous or bryophytic plants, Project MAXUS, At x-trans 8,0m Lot 640 (USNM), 1♂ same except 00°39'10"S 76°26'W, 8.ii.1995, in terre firme forest, At Trans 10, Sta. 4, Lot 963 (USNM), 2♂ same except At Trans 10, Sta. 7, Lot 966 (USNM), 1♂ same except 4.ii.1996, At Trans 2, Sta. 3, Lot 1413 (USNM), 1♂ same except At Trans 2, Sta. 8, Lot 1418 (USNM). **FRENCH GUIANA:** 2♂, 2♀ Sinnamary (Commune), Sinnamary, Petit Saut (05°11'N 52°51'W), 1–31.x.2000, Malaise trap, Philippe Cerdan, FRGY/2000/010B (CNC), 1♂ same except (MPCB), 1♂ same except (KBIN), 1♂ same except Pointe Combi (05°18'N 52°56'W), rainforest, FRGY/2000/008 (CNC). **SURINAM:** 1♂, Colakreek, nr. Zanderij (05°27'58"N 55°13'47"W), 16–28.vi.2006, Malaise trap, Savannah forest, Menno Reemer (MPCB).

Distribution. *Cheiromyia palmaticornis* is now known from Ecuador, northern Brazil (Amapá, Pará), Surinam and French Guiana (Fig. 8B).

Remarks. Dyte (1980) mentioned that the British Museum has a specimen determined by Oldroyd as *C. palmaticornis* from Mazaruni, Guyana, that was taken as prey of the asilid *Ommatius marginellis* (F.). That specimen (which is mounted on the same pin as the asilid) along with a second specimen (also from Mazaruni) is actually *Cheiromyia brevitaris* Brooks **sp. nov.** (see above).

Cheiromyia pennaticornis (Parent)

(Figs. 1C–D, 2A,E, 7A–C, 8B)

Cheirocerus pennaticornis Parent, 1931: 11.

Cheiromyia pennaticornis (Parent): Dyte 1980: 223.

Recognition (male). This species can be easily recognized by the following features: postpedicel elongate, triangular, with 10–11 projections on the outer surface (Figs. 1C,D); head broad, face and clypeus broad and opaque yellow (Fig. 2A); wing with brownish tint (Fig. 2E).

Redescription. Male: Body length: 4.9–5.4 mm, wing length: 4.8–5.1 mm. **Head:** Distinctly broader than high. Postoculars setae: upper 6–7 dark, lower setae pale, lowermost 4–5 setae dark. Frons subrectangular (wider than high), short, dark with green-blue and violet metallic reflections. Face (Fig. 2A) opaque yellowish brown, very broad. Clypeus concolorous with face, broad, subrectangular (wider than high), lower margin truncate, ending well above lower eye margin. Palpus pale, subovoid, projecting anteriorly, outer surface with well-developed anteriorly projecting setulae. Proboscis projecting anteriorly, anterior surface of each labellar lobe with close-set row of 3 long curly hairs. Antenna (Fig. 1C,D) mainly pale, scape and pedicel infuscated dorsally, postpedicel with dorsal margin dark and ventral margin infuscated on medial surface, postpedicel projections dark, stylus dark; scape obconical, with acute medial and ventral process; pedicel somewhat expanded and flattened; postpedicel triangular and elongate, about 4x as long as wide, evenly tapering toward apex, with 8–11 pubescent digitiform projections on outer surface, projections occasionally bifurcate, basalmost projection short with wider base; stylus dorsal, well before middle of dorsal margin of postpedicel, basal article elongate but not extending to tip of postpedicel, distal article plumose. **Thorax:** Scutum metallic green with blue and violet reflections, dark bronze area above notopleuron (pre- and postsutural). Scutellum metallic green with violet or coppery reflections. Mesopleuron gray pruinose with dark often brownish background coloration, with metallic reflections. **Legs:** Coxae mainly dark, femora pale, tibia and tarsi mainly pale to distinctly infuscated. I: CxI mainly dark with pale area mediobasally; FI with dense setulae on av

surface; TI not swollen; It₁₋₅ decreasing in length distally, It₃₋₅ with narrow strip of pale velvety pile on ventral surface, claws enlarged and stout (often crossed in preserved specimens). II: CxII mainly dark, tip of anterior surface pale; tarsus II entirely dark or infusate from tip of IIt₁₋₅. III: CxIII dark; TIII infusate on anterior and posterior surface; tarsus III entirely dark. **Wing:** With uniform brownish tint; M with weak arc beyond bend (Fig. 2E), similar to *C. bicornis* and *C. palmaticornis*. **Abdomen:** Tergites 1 – 5 dark metallic greenish-black, with silverish pruinosity laterally. *Hypopygium* (Figs. 7A–C): Epandrium with left bv epandrial lobe rounded apically sometimes with dentiform projection immediately distad bv epandrial seta, right bv lobe rounded and projected, sometimes with dentiform projection immediately distad bv epandrial seta; apv epandrial lobe elongate, projecting ventrally, with 2 long apicolateral setae, bifurcate apically. Surstylus: dorsal arm with sac-like medioventral lobe, with dorsal finger-like process bearing short apical seta, apex with microtrichia ventrally; ventral arm with sinuous apical seta, subapical crest present. Postgonite digitiform. Cercus pale with broad dark outer margin, subovoid, apical margin somewhat truncate, with long fine apical seta. Hypandrium with medial notch apically, left side with small dentiform process. Phallus strongly widened preapically, with preapical flap-like dorsal process, apex narrow. Sperm pump elongate; ejaculatory apodeme with ventral curve. **Female:** Unknown.

Type material examined. HOLOTYPE ♂ from Sarampiuni, La Paz Department, Bolivia, labelled: “Bolivia-Mapiri/ 13.3.03/ Sarampioni [15°25'S 68°06'W] 700” [green label]; “Typus/ Cheirocerus/ pennicornis [sic!] Par.” [red label]; “Cheirocerus/ pennicornis [sic!] n.sp./ O. Parent”; “Staatl. Museum für Tierkunde, Dresden”; “Coll. W. Schnuse/ 1911 – 3” [pale green label]; “SYNTYPUS/ des. U.Kallweit/ 1993” [orange label]; “Cheirocerus/ pennaticornis”; “HOLOTYPE/ *Cheiromyia pennaticornis* (Parent)” [red label] (SMTD).

Additional material examined. BRAZIL: 3♂ Acre, Mâncio Lima (07°36'S 72°53'W), Parque Nacional da Serra do Divisor, 5.xi.2007, Malaise, L. Menezes (MZSP); 1♂ Amazonas, Manaus (03°06'S 60°01'W), 13.ii.1976 (INPA); 1♂ Pará, Tucuruí (03°46'S 49°40'W), Vila Brava, 27.vi.1980, eq. Nunes de Mello (INPA).

Distribution. *Cheiromyia pennaticornis* is known from the type locality in the village of Sarampiuni, on the Rio Sarampiuni (a tributary of the Rio Mapiri), La Paz Department, Bolivia, and from the Brazilian States of Acre, Amazonas and Pará (Fig. 8B).

Remarks. Kallweit and Negrobov (1994) listed the holotype of *C. pennaticornis* in their catalog of dolichopodid types in the SMTD, but the specimen was mislabelled as a syntype in 1993. We have added a holotype label in order clarify the status of this specimen. Prior to this study, the terminalia of the male holotype was removed and macerated, presumably with KOH or NaOH. It is now completely transparent and nearly impossible to see in the genitalia vial pinned under the specimen.

Species Removed from *Cheiromyia* Dyte

Paraclius maculipennis (Van Duzee), 1934 comb. nov.

Sarcionus maculipennis Van Duzee, 1934: 373.

Cheiromyia maculipennis (Van Duzee): Brooks 2005: 43.

Remarks. *Cheiromyia maculipennis* (Van Duzee) is transferred to *Paraclius* Loew as a result of the restricted generic concept of *Cheiromyia* adopted here. This species was originally described in *Sarcionus* Aldrich (= *Pelastoneurus* Loew, see Brooks 2005) and subsequently transferred to *Cheiromyia* by Brooks (2005) because of its similarly enlarged and folded sperm pump. This species keys out to *Paraclius* in Bickel's (2009) recent treatment of the New World dolichopodid genera.

Type material examined. HOLOTYPE ♂ from Cuyuni-Mazaruni (Region 7), Guyana, labelled: “Kartabo [06°23'N 58°42'W]/ Bartica District/ British Guiana/ 1921”; “*Sarcionus/ maculipennis/* Holotype. Van Duzee” (AMNH).

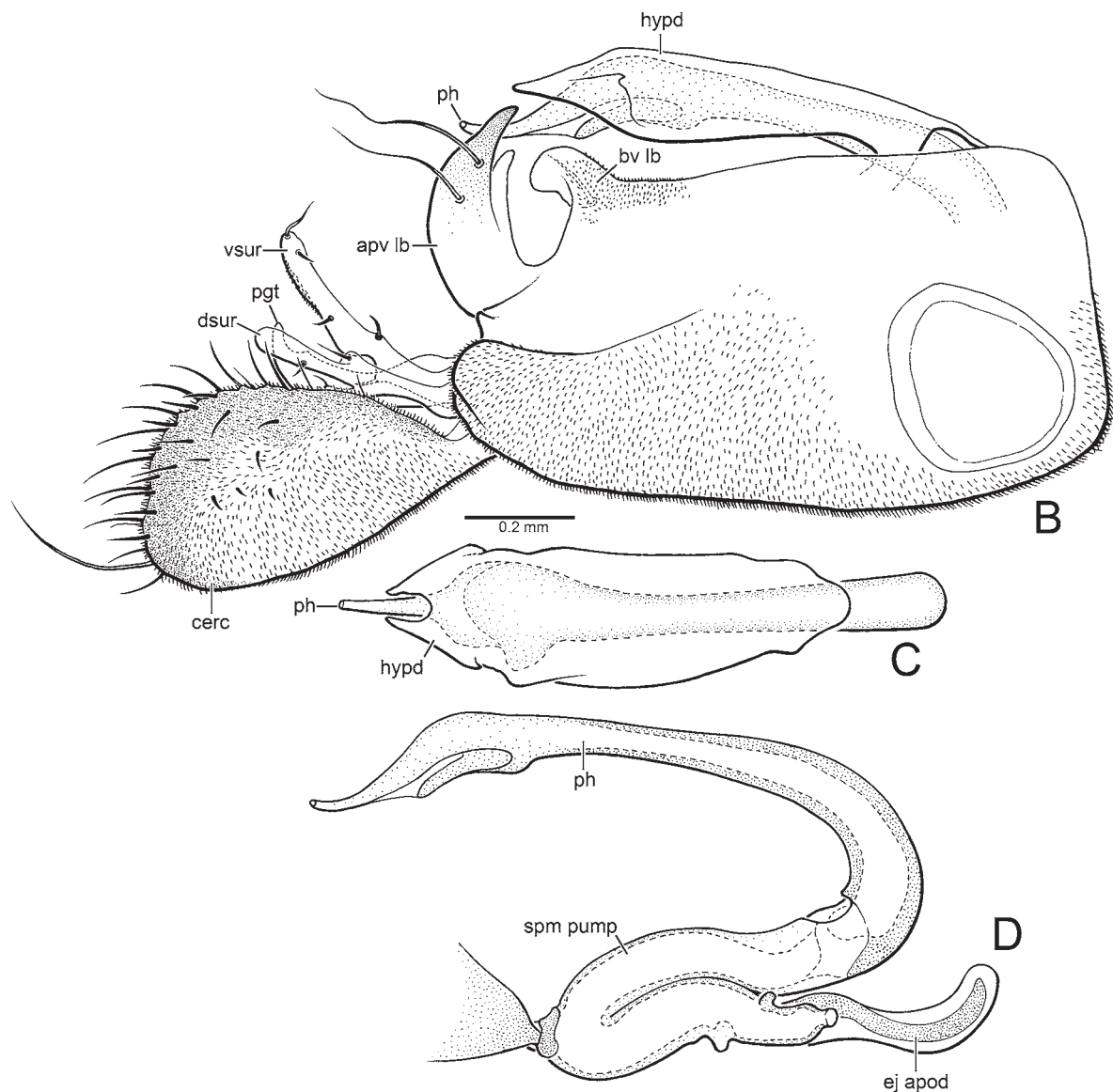


FIGURE 7. *Cheiromyia pennaticornis* (Parent) male terminalia: (A) hypopygium (left lateral view); (B) hypandrium and phallus (ventral view); (C) sperm pump and phallus (left lateral view). Abbreviations: apv lb: apicoventral epandrial lobe; bv lb: basiventral epandrial lobe; cerc: cercus; dsur: dorsal arm of surstylus; ej apod: ejaculatory apodeme; hypd: hypandrium; pgt: postgonite; ph: phallus; spm pump: sperm pump; vsur: ventral arm of surstylus.

Discussion

As a result of Capellari and Amorim's (2009) discovery of intermediate degrees of sperm pump folding in their new species of *Paraclius* from the Brazilian Atlantic Forest, we have here opted to redefine *Cheiromyia* in its original sense (i.e., primarily based on the modified male antenna). Although the development of a folded sperm pump appears to be a uniquely derived synapomorphy within the Dolichopodinae, it is not at present a practical means to characterize *Cheiromyia* and distinguish it from *Paraclius*. By re-adopting the original concept of *Cheiromyia*, generic identification problems that would be encountered with intermediate species such as *Paraclius amphiatheratus* Capellari & Amorim, *P. dicrophallus* Capellari & Amorim,

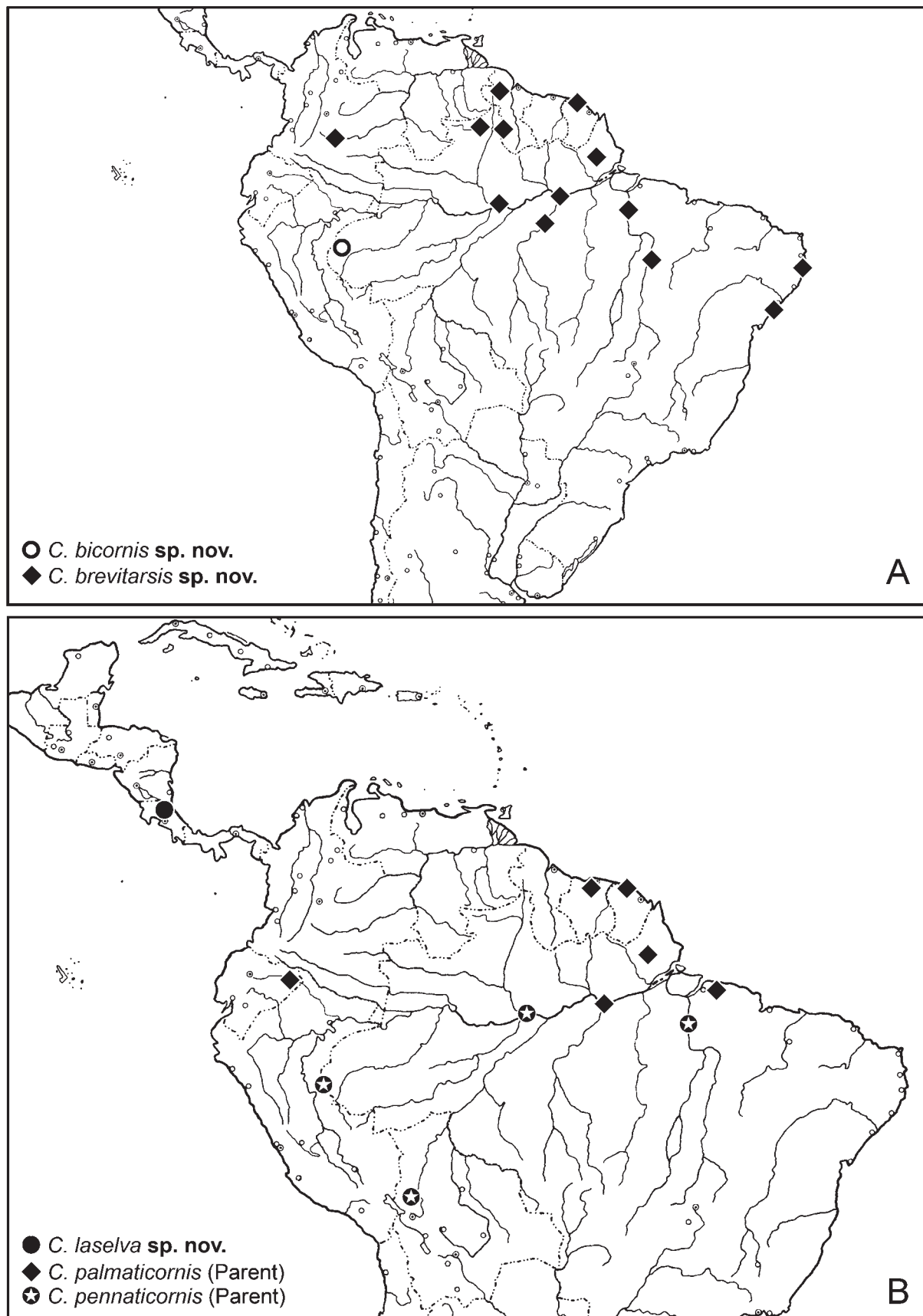


FIGURE 8. Known distribution of *Cheiromyia* species: (A) *C. bicornis* Brooks **sp. nov.** and *C. brevitarsis* Brooks **sp. nov.**; (B) *C. laselva* Brooks **sp. nov.**, *C. palmaticornis* (Parent), and *C. pennaticornis* (Parent).

P. parenti Capellari & Amorim and *P. sagittatus* Capellari & Amorim, can be avoided. Re-adopting the original concept of *Cheiromyia* is also consistent with Bickel's (2009) treatment of the genus in his recent key to the genera of Dolichopodidae of the New World.

Since the publication of Brooks' (2005) monograph, we have discovered an additional 14 Neotropical species, both new and previously described (e.g., "*Sarcionus*" *maculatus* Van Duzee 1929), that also possess a distinctively folded sperm pump (i.e., with opposing surfaces tightly appressed), but that lack postpedicel projections. Precise relationship of these species to *Cheiromyia* and to those species of *Paraclius* with intermediate degrees of folding, or without a folded sperm pump, still needs to be determined. These species will be treated in a separate paper dealing with *Paraclius* in the Neotropical Region.

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